

IN THE CLAIMS:

Claims 1-6 (canceled).

Claim 7 (canceled).

Claim 8 (canceled).

Claim 9 (currently amended): A Code Division Multiple Access (CDMA) communication system utilizing a composite set of Zero Cross Correlation Zone spreading sequence (ZCCZ) characterized in that said system comprises:

means for ~~producing~~ generating said composite set of ZCCZ spreading sequences ~~using techniques~~ comprising:

means for ~~producing~~ generating a set of K sequences named by the k-th ($k=1, 2, \dots, K$) ZCZ sequence with length N_1 belonging to a Zero Correlation Zone (ZCZ) sequence family where the k-th sequence has a value of zero for a periodic auto-correlation ~~in such~~ for a shift condition that one of a pair of said spreading sequences ~~may take~~ takes a cyclically shifted position within a shift range around the zero shift, and a periodic cross-correlation function between an arbitrary pair of sequences belonging to said ZCZ sequence family takes a value of zero in ~~[[such]]~~ a shift condition such that one of said pair of spreading sequences ~~may take~~ takes a cyclically shifted position within a shift range around the zero shift, including the 0 shift,

means for ~~producing~~ generating a block sequence family d with sequence length N_2 that is prime to N_1 , which consists of P sets of semi-orthogonal sequences denoted by $(d_1, d_2, \dots, d_p, \dots, d_P)$, each is named ~~[[where]]~~ by the p-th set d_p of semi-orthogonal sequences d_p ~~consists~~ consisting of J sequences denoted by $(d_{p1}, d_{p2}, \dots, d_{pj}, \dots, d_{pJ})$, each is named by the pj-th sequence, where the Hamming distance between an arbitrary pair of sequences belonging to said block sequence family d takes a relatively large value,

means for ~~producing~~ generating a repetitive ZCZ sequence and a repetitive block sequence by repeating both the k-th ZCZ sequence N_2 times and the pj-th sequence belonging to the p-th set of the block sequences N_1 and sequence family d N_1 $[[N_2]]$ times respectively so that said repetitive ZCZ sequence and said repetitive block sequences ~~may take~~ have the same sequence length N that is N_1 times N_2 , and

means for ~~producing~~ generating in advance a set of KPJ product sequences with sequence length N by multiplying in chip wise respective said repetitive ZCZ sequences by

respective said repetitive block sequences, as a composite set of ZCCZ spreading sequences S_{kp}^j composed of three layers denoted by ~~[[said]]~~ parameters k, p and j.

Claim 10 (currently amended): A Code Division Multiple Access (CDMA) communication system according to claim 9, wherein said CDMA system is composed of N_C cells each of which includes a base station and N_U users who ~~are belonging~~ belong to a cell and concurrently and temporarily are given communication services with a base station belonging to said cell using ~~a multi-ary~~ an M-ary modulation scheme with N_M spreading sequences is characterized in that said system comprises:

means for using $N_C N_U N_M$ spreading sequences ~~chosen out of a comosit~~ from said composite set of ZCCZ sequences $\{S_{kp}^j\}$ having three layers denoted by parameters $k(=1,2,\dots,K)$, $p(=1,2,\dots,P)$ and $j(1,2,\dots,J)$ whose total number amounts to KPJ ,

means ~~[[of]]~~ for allocating ~~[[said]]~~ a KPJ ZCCZ sequences to $N_C N_U$ user-stations ~~[[for]]~~ of an up-link ~~multi-ary~~ M-ary transmission or N_C base-stations for a down-link ~~multi-ary~~ M-ary transmission under ~~[[such]]~~ a condition that $N_C N_U N_M$ equals or less than KPJ where each of said three numbers, N_C , N_U and N_M is ~~allowed to take~~ an integer larger than one.

Claim 11 (currently amended): A Code Division Multiple Access (CDMA) communication system according to claim 9 ~~characterized in that~~ wherein:

~~as a set of J block sequences with length N_2 for a case of $P=1$, respective~~ ~~[[raw]]~~ rows of a modified Hadamard matrix with a size $N_H \times (N_H-1)$ which is made by deleting the first column of an Hadamard matrix with a size $N_H \times N_H$ ~~are used~~ by setting N_2 as N_H-1 are used as J sequences with length N_2 for a case of $P=1$.

Claim 12 (currently amended): A Code Division Multiple Access (CDMA) communication system according to claim 9 ~~characterized in that~~ wherein:

~~as a composite set of PJ block sequences with length N_2 being equal to N_H-1 layered by said parameters p and j,~~ respective rows of a semi-orthogonal matrix with a size $N_H \times (N_H-1)$ which is made by deleting the first column of a deformed Hadamard matrix H_p ~~produced~~ generated by multiplying an Hadamard matrix with a size $N_H \times N_H$ by ~~[[such]]~~ a diagonal matrix S_p ~~that the in which the~~ diagonal entries are the components of the p-th sequence s_p with length N_H ~~belonging which belong~~ to a set of P low correlation sequences denoted by $(s_1, s_2, \dots, s_p, \dots, s_P)$ ~~[[where]]~~ wherein a pair of said low correlation sequences have a large ~~Hamming~~ Hamming

distance are used as PJ sequences with length N_2 being equal to N_H-1 layered by said parameters p and j .

Claim 13 (currently amended): A Code Division Multiple Access (CDMA) communication system according to claim 9 ~~characterized in that~~ wherein:

one layer of said composite set of ZCCZ sequences $\{S_{KP}^j\}$ having three layers denoted by k , p and j is allocated to N_C cells to discriminate respective said cells, and said layer ~~operators~~ operates as a scrambling code for transmission and as a descramble code for reception.